

1969

**OPERATING
SUMMARY**

GODERICH

**water
treatment
plant**

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W38
1969
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JUN 26 1970

**ONTARIO WATER
RESOURCES COMMISSION**

ONTARIO WATER RESOURCES COMMISSION

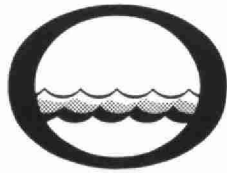
Division of Plant Operations

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Water management in Ontario

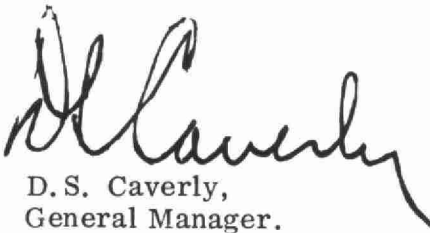
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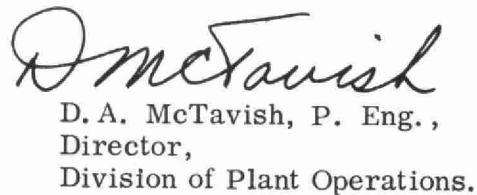
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Toronto 195
Ontario

The operating efficiency and financial status of the water treatment facilities operated for you in 1969 are presented in the following pages.

The regional operations engineer's comments and the statistical data will assist you in gauging the plant's level of performance. A new flow chart and up-to-date design data are also provided.

Various divisions and sections within the Commission have co-operated in providing what we trust is an accurate and concise annual operating summary.


D.S. Caverly,
General Manager.


D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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RESOURCES COMMISSION

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GODERICH
water treatment plant

operated for

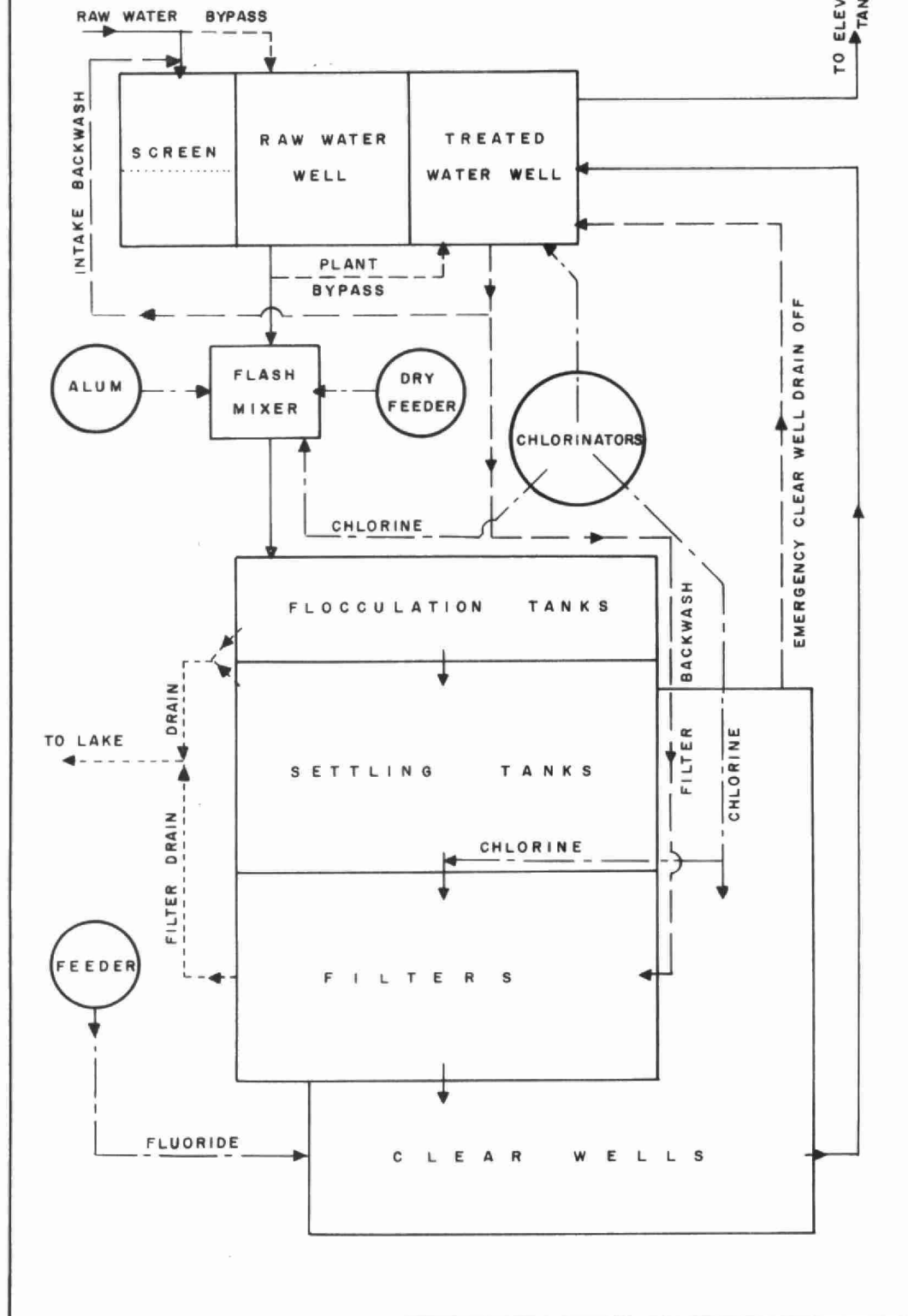
THE TOWN OF GODERICH

by the

ONTARIO WATER RESOURCES COMMISSION

1969 ANNUAL OPERATING SUMMARY

GODERICH WATER TREATMENT PLANT



DESIGN DATA

NOMINAL CAPACITY

1.5 mgd

RAW WATER SOURCE

Lake Huron

INTAKE

Rock-filled timber crib with cover plate

Min. water depth -
above bellmouth 15.25'
above crib 13.00'

Pipe: 1600 ft of 30" dia concrete

SCREENING

Type: Link-Belt travelling screen
3/8" opening

Size: One 3' wide x 23' deep - speed
10 mg/l

FLASH MIXING

Chamber Size: One 7.67' x 7.67' x
8.50'

Volume: 500 ft³ or 3125 gal

Detention: 3.1 min @ 1.5 mgd

Mixer: "Lightnin" with 30" dia propeller
84 rpm

FLOCCULATION

Stuart-Carter walking beam flocculator
mechanism

Tank Size: Two 14.5' x 20.5' x 15.7'
deep

Total Volume: 9340 ft³ or 58,400 gal
Detention: 56 min @ 1.5 mgd

SEDIMENTATION

Size: Two 61.5' x 20.5' x 7.5' deep

Volume: 19,100 ft³ or 120,000 gal
Detention: 1.9 hr @ 1.5 mgd
Overflow: 590 gpd/ft²

FILTRATION

Type: Gravity sand filter - 24" sand
0.5-0.55 min

Size: Four 12' x 12'

Rate: 1.8 igpm/ft² @ 1.5 mgd

Backwash: 3470 gpm (imp)

CHLORINATION

One W & T 100 lb/day (prechlorination)

One W&T 10 lb/day (post chlorination)

One W&T 100 lb/day (standby)

STORAGE

Clear Wells - 24,000 gal

Reservoir - 91,400 gal

Town elevated tank - 200,000 gal

O.H. elevated tank - 250,000 gal

CAPACITY OF UNITS

Intake - 6.4 mgd @ 2.44 fps

Low Lift Pumps #1 pump 0.95 mgd @
6.7' head

#2 pump 1.60 mgd @

6.7' head

#3 pump 1.60 mgd @

6.7' head

Combined #1 & 2 or 3 - 2.55 mgd @
6.7' head

Filters @ 1.8 gpm, 1.49 mgd

HIGH LIFT PUMPS

#4 pump 0.75 mgd @ 315' head

#5 pump 1.25 mgd @ 315' head

#6 pump 1.25 mgd @ 315' head

Combined #4 & 5 or 6 2.00 mgd



RESUME

The average daily flow of 0.78 million gallons was equal to 52% of the design flow of 1.5 mgd. The plant design flow was exceeded during the months of July, August and September of 1969.

In response to a local referendum, fluoridation of the treated water supply was started on November 10, 1969.

Total operating cost for the year was \$59,477.74, an increase of \$5,633.36 from the previous year. Despite this increase, unit costs of 21 cents for treating 1,000 gallons of water remained close to those of 1968.

GENERAL

The plant is supervised 24 hours per day, seven days per week, with each man working an average of 40 hours per week. The permanent staff of 5 is supplemented by casual labour to allow for vacations, sick leave and heavy work loads. A total of 5.6 men is required to give the plant full coverage.

The staff maintained a clean, attractive and very efficient plant for the Town of Goderich, and no major operational problems were noted during the year.

PROCESS DATA

The total flow of 286.29 million gallons showed an increase over previous years' consumption, and averaged 23.86 million gallons per month or 0.78 million gallons per day. Daily demands reached their maximums from July through September, and their minimums from March through May. The average daily consumption increased 13 percent, from 0.69 million gallons in 1968 to 0.78 million gallons in 1969.

CONCLUSIONS

Although the maximum daily flows were sometimes above the rated capacity of the plant during the summer, there was no difficulty in supplying an adequate volume of treated water to the distribution system.

These high demands were experienced despite water restrictions. The Ontario Water Resources Commission is now studying methods of increasing plant capacity, with the possibility of modifying existing filters and sedimentation tanks.

PROJECT COSTS

NET CAPITAL COST (Final)

| | | |
|--|-------------------|---------------------|
| Goderich Town | \$1,001,579.07 | |
| Deduct payments from municipality | <u>308,383.05</u> | \$693,196.02 |
| Ontario Hospital | - | |
| Deduct payments from Ontario Hospital | <u>-</u> | |
| Long Term Debt to OWRC | | <u>\$693,196.02</u> |
| Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969: | | |
| Goderich Town | \$ 13,988.00 | |
| Ontario Hospital | <u>-</u> | <u>\$ 13,988.00</u> |

BILLINGS

The total cost to the municipality during 1969 was as follows:

Net Operating

| | | |
|------------------|-----------------|--------------|
| Goderich Town | \$ 56,164.83 | |
| Ontario Hospital | <u>3,312.91</u> | \$ 59,477.74 |

Debt Retirement

| | | |
|------------------|--------------|-----------|
| Goderich Town | \$ 13,988.00 | |
| Ontario Hospital | <u>-</u> | 13,988.00 |

Reserve

| | | |
|------------------|---------------|----------|
| Goderich Town | \$ 4,397.11 | |
| Ontario Hospital | <u>333.58</u> | 4,730.69 |

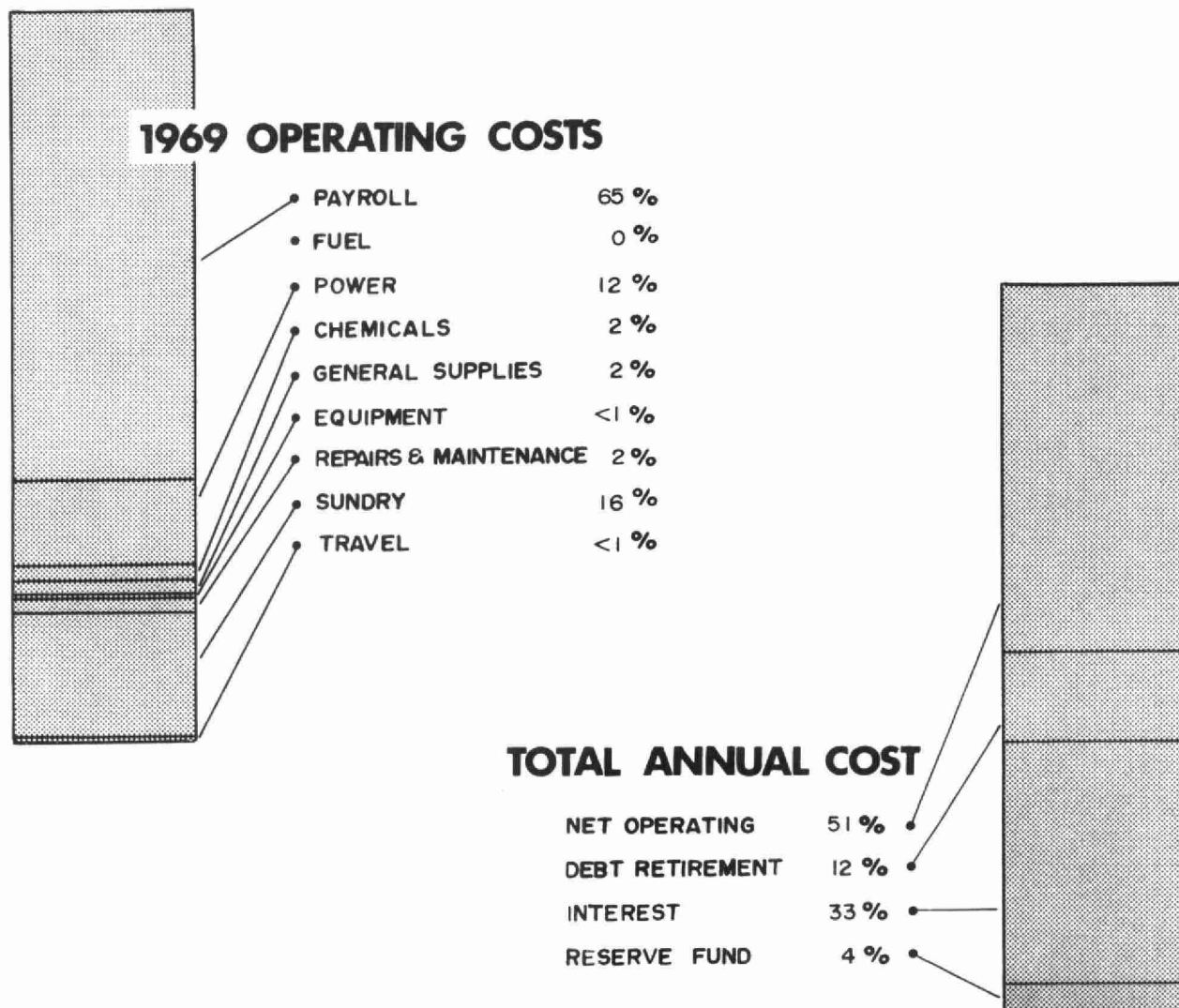
Interest Charged

| | | |
|------------------|--------------|------------------|
| Goderich Town | \$ 38,808.48 | |
| Ontario Hospital | <u>-</u> | <u>38,808.48</u> |

| | | |
|-------|--|---------------------|
| TOTAL | | <u>\$117,004.91</u> |
|-------|--|---------------------|

RESERVE ACCOUNT

| | <u>Total</u> | <u>Ontario Hospital</u> | <u>Town of Goderich</u> |
|--|---------------------------|-----------------------------|-----------------------------|
| Balance at January 1, 1969 | \$41,426.48 | \$2,362.98 | \$39,063.50 |
| Add: Payments in 1969 | <u>4,730.69</u> | <u>333.58</u> | <u>4,397.11</u> |
| | \$46,157.17 | \$2,696.56 | \$43,460.61 |
| Add: Interest earned on Reserve funds in 1969 | <u>2,455.34</u> | <u>136.72</u> | <u>2,318.62</u> |
| | \$48,612.51 | \$2,833.28 | \$45,779.23 |
| Less Expenditures | <u>4,000.00</u> | <u>-</u> | <u>4,000.00</u> |
| Balance @ December 31, 1969 | <u><u>\$44,612.51</u></u> | <u><u>\$2,833.28</u></u> | <u><u>\$41,779.23</u></u> |



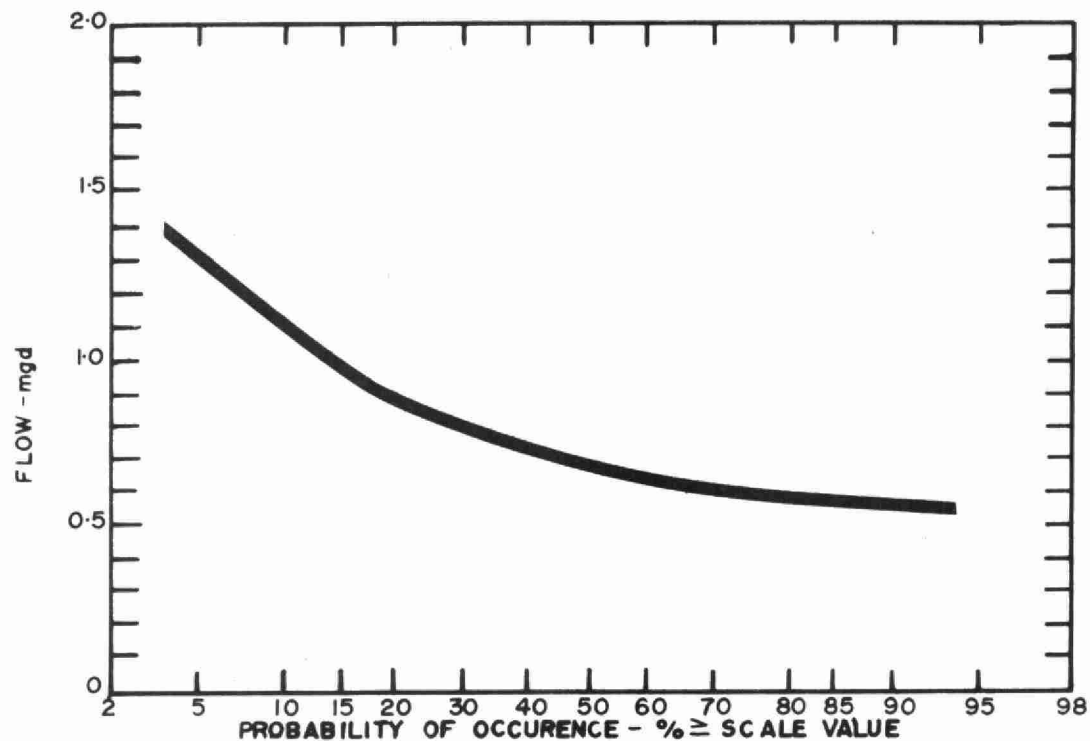
Yearly Operating Costs

| YEAR | MILLION GALLONS TREATED | TOTAL OPERATING COSTS | COST PER THOUSAND GALLONS |
|------|-------------------------|-----------------------|---------------------------|
| 1965 | 283.003 | \$39,935.00 | \$0.14 |
| 1966 | 270.556 | 44,799.00 | 0.17 |
| 1967 | 235.314 | 47,492.00 | 0.20 |
| 1968 | 252.91 | 53,844.00 | 0.20 |
| 1969 | 286.29 | 59,477.74 | 0.21 |

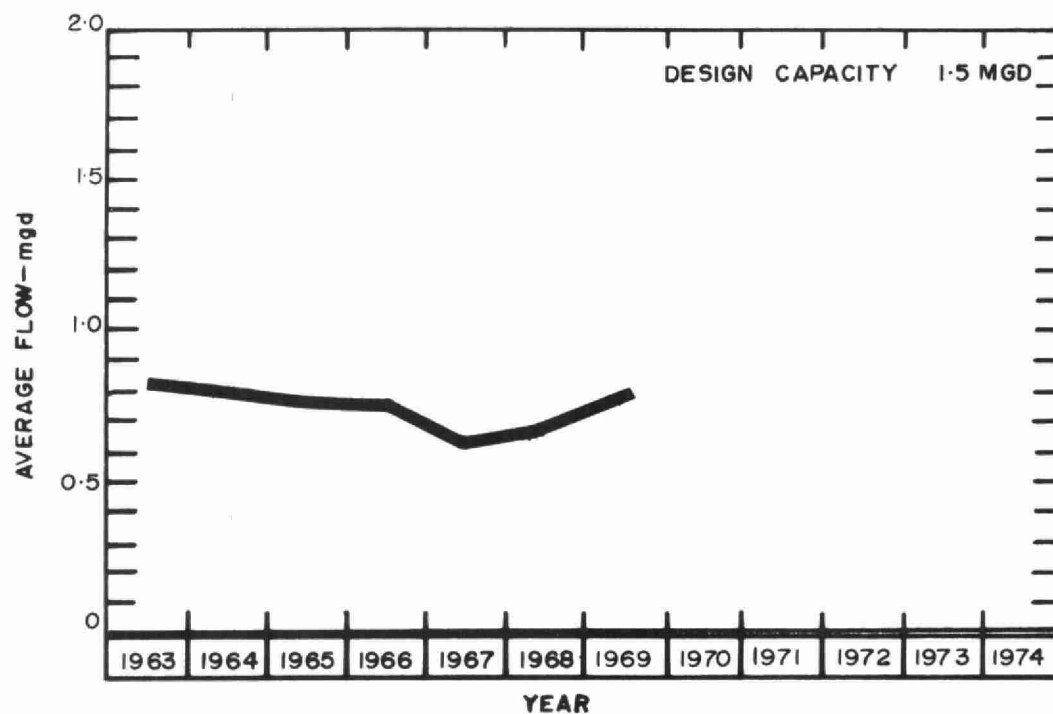
Monthly Operating Costs

| MONTH | TOTAL | PAYROLL | CASUAL | FUEL | POWER | CHEMICAL | GENERAL SUPPLIES | EQUIPMENT | REPAIRS & MAINTENANCE | SUNDRY | TRAVEL |
|-------|----------|----------|---------|------|---------|----------|---------------------|-----------|--------------------------|---------|--------|
| JAN | 4965.94 | 4017.52 | 305.41 | - | 596.40 | - | 20.00 | - | - | 12.06 | 14.55 |
| FEB | 3761.39 | 1601.64 | 371.27 | - | 614.80 | - | 133.31 | - | - | 24.82 | 14.55 |
| MAR | 3795.73 | 2638.43 | 282.82 | - | 611.20 | - | 86.25 | - | 26.19 | 134.94 | 15.90 |
| APRIL | 3881.94 | 2292.46 | 389.38 | - | 618.00 | - | 154.04 | - | 390.12 | 19.64 | 18.30 |
| MAY | 4148.02 | 2895.96 | 176.26 | - | 601.20 | - | 40.75 | - | 321.87 | 94.28 | 17.70 |
| JUNE | 4118.68 | 3154.94 | 247.20 | - | 580.80 | - | 77.65 | - | 20.46 | 16.33 | 21.30 |
| JULY | 3731.48 | 2684.34 | 419.61 | - | 511.50 | - | 36.60 | - | 16.70 | 17.63 | 45.10 |
| AUG | 6015.14 | 3995.38 | 477.21 | - | 675.00 | 634.62 | 81.72 | - | 102.63 | 31.33 | 17.25 |
| SEPT | 11826.83 | 2702.43 | 87.31 | - | 683.33 | 423.28 | 27.00 | - | - | 7885.78 | 17.70 |
| OCT | 4149.10 | 2710.30 | 291.58 | - | 640.40 | - | 82.91 | 12.04 | 82.22 | 254.92 | 74.73 |
| NOV | 3802.27 | 2686.25 | 176.26 | - | 539.80 | 245.70 | 68.21 | - | 25.95 | 60.10 | - |
| DEC | 5281.22 | 2717.04 | 158.55 | - | 589.20 | 184.80 | 194.13 | 11.92 | 478.59 | 927.49 | 19.50 |
| TOTAL | 59477.74 | 35097.69 | 3382.86 | - | 7261.63 | 1488.40 | 1002.57 | 23.96 | 1464.73 | 9479.32 | 276.58 |

PROCESS DATA

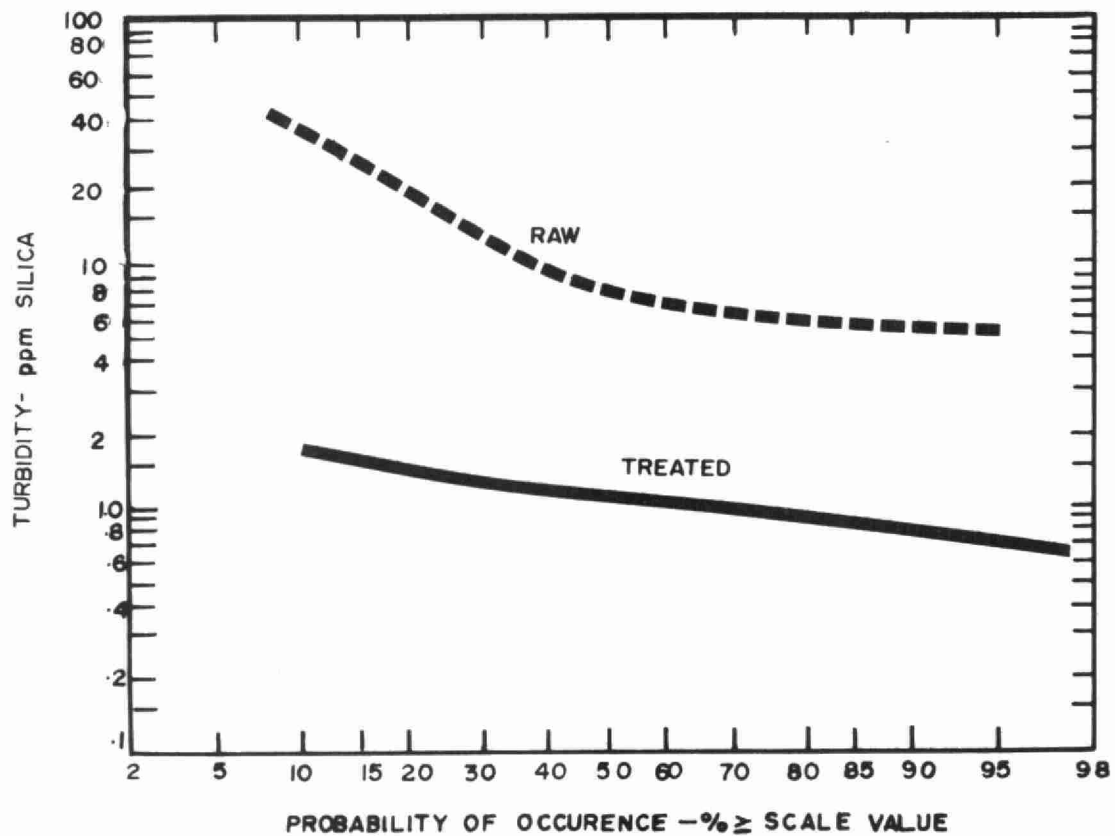


FL O W S

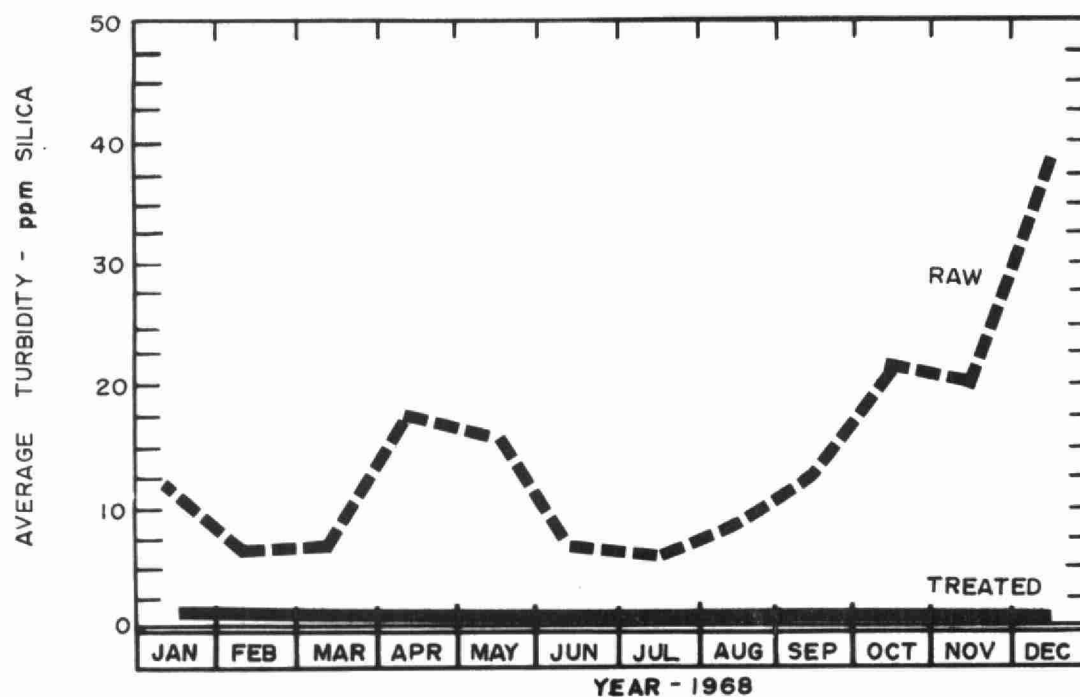


PLANT FLOWS

| MONTH | TOTAL FLOW mil gal | AVERAGE DAILY FLOW mil gal | MAXIMUM DAILY FLOW mil gal | MINIMUM DAILY FLOW mil gal |
|---------|-----------------------|----------------------------------|----------------------------------|----------------------------------|
| JAN | 21.01 | 0.68 | 0.84 | 0.55 |
| FEB | 18.40 | 0.66 | 0.77 | 0.55 |
| MAR | 18.66 | 0.60 | 0.70 | 0.48 |
| APR | 18.82 | 0.63 | 0.74 | 0.50 |
| MAY | 21.01 | 0.68 | 1.11 | 0.51 |
| JUNE | 21.84 | 0.73 | 0.97 | 0.55 |
| JULY | 34.19 | 1.10 | 1.54 | 0.73 |
| AUG | 37.80 | 1.22 | 1.68 | 0.86 |
| SEPT | 29.83 | 0.99 | 1.52 | 0.69 |
| OCT | 22.90 | 0.74 | 0.90 | 0.63 |
| NOV | 20.53 | 0.68 | 0.82 | 0.56 |
| DEC | 21.30 | 0.69 | 0.82 | 0.56 |
| TOTAL | 286.29 | - | - | - |
| AVERAGE | 23.86 | 0.78 | - | - |



TURBIDITY



TURBIDITY

The turbidity of water is a measure of the interference presented by suspended matter such as clay, silt, finely divided organic matter and microscopic organisms present in the water. The OWRC standard for turbidity in treated water is one Jackson Turbidity Unit.

Turbidity in the raw water was less than 10 JTU 39% of the time during the year. Turbidity of the treated water varied from 0.6 to approximately 1.5 JTU.

The raw water turbidity was often higher than normally expected because the plant's intake chamber is near the mouth of the Maitland River, and because of the shallowness of Lake Huron in this vicinity.

Alum was used 54% of the time to aid in the removal of turbidity; it is required only when the raw water turbidity exceeds 7 JTU. A total of 27,456 pounds of alum at a dosage rate of 14.7 milligrams per litre was used during the year, the greatest demand for alum occurring in May, June and December, when 3,891 pounds, 3,694 pounds and 3,385 pounds were used respectively.

To maintain a fluoride residual of 1.0 mg/l in November and December, 482.5 pounds of sodium silicofluoride were used.

The total amount of chlorine used during 1969 was 3,441.1 lbs. which averaged to a pre-chlorination dosage of 1.13 lbs. to maintain a residual of 0.2 mg/l throughout the treatment process. An additional post-chlorination dosage of 0.10 mg/l was required to maintain a residual of 0.3 mg/l in the treated water.

Two hundred and eighty-three bacteriological samples of raw and treated water were taken during the year. A bacti count was noted in the treated water only once, and was attributed to slight contamination during sampling.

CHLORINATION and DISINFECTION

| MONTH | COLIFORM | | | | CHLORINATION | | |
|---------|-------------------------|----------------------------|-------------------------|------------------------------|-------------------|-------------------------|------------------------|
| | RAW WATER | | TREATED WATER | | CHLORINE | DOSAGE | |
| | NUMBER OF SAMPLES TAKEN | AVERAGE DENSITY No./100 ml | NUMBER OF SAMPLES TAKEN | No. WITH COLIFORMS > 0/100ml | TOTAL USED pounds | PRE - CHLORINATION mg/l | POST-CHLORINATION mg/l |
| JAN | 4 | > 10 | 18 | 0 | 239.9 | 1.06 | 0.08 |
| FEB | 4 | > 75 | 23 | 0 | 232.1 | 1.17 | 0.10 |
| MAR | 5 | > 15 | 23 | 1 | 232.1 | 1.14 | 0.10 |
| APR | 4 | 20 | 18 | 0 | 321.0 | 1.55 | 0.16 |
| MAY | 4 | > 9 | 19 | 0 | 401.9 | 1.76 | 0.16 |
| JUNE | 5 | 10 | 22 | 0 | 245.2 | 1.02 | 0.10 |
| JULY | 4 | 4 | 19 | 0 | 344.9 | 0.92 | 0.09 |
| AUG | 4 | > 26 | 18 | 0 | 414.7 | 1.00 | 0.10 |
| SEPT | 5 | 2 | 22 | 0 | 339.1 | 1.05 | 0.09 |
| OCT | 3 | 3 | 13 | 0 | 239.8 | 0.95 | 0.10 |
| NOV | 4 | 11 | 18 | 0 | 208.1 | 0.93 | 0.08 |
| DEC | 3 | 23 | 21 | 0 | 222.3 | 0.98 | 0.06 |
| TOTAL | 49 | - | 234 | 1 | 3441.1 | - | - |
| AVERAGE | - | - | - | - | 286.8 | 1.13 | 0.10 |

WATER QUALITY

| PROPERTY | RAW WATER | | | | TREATED WATER | | | | DESIRABLE STANDARDS |
|------------------------------------|-------------------|------|------|------|-------------------|------|------|------|---------------------|
| | NUMBER OF SAMPLES | AVG. | MAX. | MIN. | NUMBER OF SAMPLES | AVG. | MAX. | MIN. | |
| HARDNESS mg/l CaCO_3 | 13 | 127 | 222 | 100 | 25 | 122 | 196 | 100 | 80 - 100 |
| ALKALINITY mg/l CaCO_3 | 13 | 109 | 217 | 82 | 25 | 98 | 159 | 77 | 30 - 100 |
| IRON mg/l Fe | 13 | .67 | 1.50 | .15 | 25 | .11 | .25 | .05 | < 0.3 |
| COLOUR units | 11 | < 11 | 20 | < 5 | 24 | < 6 | 20 | 5 | < 5 |
| CHLORIDE mg/l Cl^- | 13 | 9 | 14 | 7 | 25 | 13 | 29 | 8 | < 250 |
| FLUORIDE mg/l F^- | 0 | 0 | 0 | 0 | 156 | 1.0 | 1.10 | .85 | 0.8 - 1.2 |

PROCESS CHEMICALS

| MONTH | ALUM | | | FLUORIDE | |
|---------|---|------------------------|----------------------------|--|------------------------------------|
| | POUNDS ALUM USED as Al_2O_3 | NUMBER OF DAYS USED | DOSAGE (when used) mg/l | POUNDS Na_2SiF_6 USED | DOSAGE mg F^-/l |
| JAN | 1790 | 13 | 20.2 | - | - |
| FEB | 100 | 2 | 8.0 | - | - |
| MAR | 810 | 8 | 16.9 | - | - |
| APR | 2080 | 19 | 17.4 | - | - |
| MAY | 3890 | 31 | 18.5 | - | - |
| JUNE | 3690 | 30 | 16.9 | - | - |
| JULY | 3490 | 30 | 16.9 | - | - |
| AUG | 2010 | 16 | 10.3 | - | - |
| SEPT | 1780 | 18 | 10.0 | - | - |
| OCT | 2740 | 25 | 14.8 | - | - |
| NOV | 2680 | 30 | 13.1 | 190 | 1.0 |
| DEC | 3390 | 30 | 16.4 | 292 | 1.0 |
| TOTAL | 27450 | - | - | 482 | - |
| AVERAGE | 2290 | - | 14.7 | - | 1.0 |

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Goderich water

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